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Original Article

Is it possible to prevent striae gravidarum?

Ebru Ersoy*, Ali Ozgur Ersoy, Esra Yasar Celik, Aytekin Tokmak, Sibel Ozler, Yasemin Tasci

Department of Obstetrics and Gynecology, Zekai Tahir Burak Women's Healthcare Training and Research Hospital, Ankara, Turkey

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Abstract

Background: Striae gravidarum (SG), commonly called stretch marks, is an important cosmetic problem which is not treatable, although preventive measures might be effective. The aim of this study was to determine individual risk factors causing SG and the degree to which preventive measures could be effective.

Methods: This prospective observational study included 211 singleton primiparous pregnant women who were hospitalized for birth and who did not have systemic diseases or other risk factors, like drug use or polyhydramnios. Patients were examined and divided into two groups with respect to whether or not they had striae. Individual features were compared between the two groups.

Results: While 159 patients (75.4%) had SG, 52 (24.6%) did not. Patients with striae had a significantly lower mean age and higher mean preconceptional body mass indices than ones without striae ($p < 0.001$ and $p = 0.001$, respectively). Family history ($p = 0.002$), having a male baby ($p = 0.042$), and lower educational level ($p = 0.033$) were also statistically significant in predicting striae. Use of preventive oil or drugs, smoking status, skin type, water intake, and level of financial income did not significantly predict SG.

Conclusion: Informing women preconceptionally on the importance of modifiable risk factors, such as body weight and maternal age before pregnancy, can be useful, considering that stretch marks are carried for a lifetime and there is no conclusive treatment.

Keywords: pregnancy; preventive measures; risk factors; striae distensae

1. Introduction

Stretch marks on the skin which develop on the mother during pregnancy are termed striae gravidarum (SG). Although they do not lead to medical problems, they are considered an important cosmetic problem since they may remain permanently on the skin. Striae which are red or purple in color at onset lose their color in time and become pale streaks. In severe cases, SG may lead to itchiness and restlessness in the pregnant woman.[1] The prevalence of SG varies from 50% to 90%, according to various sources.[2] They may occur anywhere, especially on the abdomen, breasts, hips, and legs.[3,4]

The etiology of SG is unknown. It has been stated that estrogen, relaxin, and adrenocortical hormones (as in Cushing's disease) may play a role in the development of striae due to their effect on collagenous tissue.[5] In another study, it was reported that decreases in elastin and fibrillin in the dermis may influence SG.[6]

Many risk factors have been suggested for the development of SG, such as prepregnancy maternal weight,[7] weight gain during pregnancy,[8] maternal age,[9] skin structure,[10] family history,[1] race, and birth weight; these have been investigated, but their effect has not been clearly proven.[5,11,12] In 1959, the “stretch” hypothesis was put forward by Poidevin,[13] and accordingly, it was thought that rapid growth in abdominal and hip circumference during pregnancy may lead to additional striae, but no relationship

Conflicts of interest: The authors declare that they have no conflicts of interest related to the subject matter or materials discussed in this article.

* Corresponding author. Dr. Ebru Ersoy, Zekai Tahir Burak Women's Healthcare, Training and Research Hospital, Talatpasa Bulvari Hamamonu, 06230, Altindag, Ankara, Turkey.

E-mail address: eebruersoy09@gmail.com (E. Ersoy).

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could be demonstrated between these factors. In various studies, no definitive method could be demonstrated to prevent or treat SG development.[14]

The aim of the present study was to investigate the effect of daily fluid intake and preventive measures, in addition to previously investigated risk factors, on the development of SG in a Turkish pregnant population.

2. Methods

A total of 211 term (37 weeks or more) primiparous pregnant women who were admitted to Zekai Tahir Burak Women's Health Care Training and Research Hospital between August 2013 and October 2013 with onset of labor were included in the present prospective observational cohort study. Approval was obtained from the ethics committee of the hospital (approval date/number: 23.08.2013/15), and written informed consent was obtained from every patient. Cases with multiple pregnancy and polyhydramnios (which increases abdominal circumference), foreknown systemic diseases (diabetes, hypertension, goiter, asthma, collagen tissue disease), those who used drugs, except for multivitamin preparations and iron compounds and cream for skin scars, and those who were not eligible to answer a questionnaire were excluded from the study. The age of the patient, pregnancy week, presence of SG, week of onset of SG, treatment used to prevent SG (oil/cream ointment, laser treatment), history of smoking, daily mean fluid intake (liters), skin type of the woman according to the Fitzpatrick classification,[15] the presence of striae in the adolescent period, a history of SG in the mother or sister, the presence of striae in other sites in the body, weight and body mass index (BMI; kg/m^2) prior to pregnancy, BMI and abdominal circumference at admission (in cm from the level of umbilicus), birth weight and sex of the infant, income level of the family according to the data of Turkish Statistics Institution, and education level of the mother, were recorded on study forms.

Cases were divided into two groups: those with striae and those without striae. Factors that could have an effect on striae development were compared between groups. In cases with SG, striae on the abdominal region were scored by the same investigator, according to the Davey method.[11] Accordingly, the abdominal region was divided into four main quadrants (lower right, upper right, lower left, upper left) and each patient was scored in the range 0−8, according to the presence of striae in each quadrant: 0 (absent), 1 (a little), or 2 (much).

All analyses were conducted using SPSS software, version 17.0 (SPSS Inc., Chicago, IL, USA). Variables were distributed homogenously in SG and non-SG groups. Variables were analyzed at the 95% confidence level. Descriptive statistics, Student t test, Chi-square (χ^2), and logistic regression analyses were used. To assess the association of SG and the amount of daily water consumption, the χ^2test for linear trend was performed. A p value < 0.05 was considered statistically significant.

3. Results

Of 211 study participants, 159 (75.4%) had SG (Group 1) and 52 (24.6%) did not have SG (Group 2). In Group 1, 71 had SG (33.6%) only in the abdominal region, 31 (14.7%) only in other regions (hip, thigh, breast), and 57 (27%) in both abdominal and other regions. When participants in Group 1 were evaluated in terms of the onset time of striae, it was established that SG developed most commonly between 29 and 36 weeks of pregnancy ($n = 60$; 37.7%), and rarely within the first 12 weeks in women without striae before pregnancy ($n = 2$; 1.3%). The severity of SG in Group 1, according to Davey scoring, was as follows: 33.9% ($n = 54$) were mild (score 1−2), 31.4% ($n = 50$) were moderate (score 3−6), and 15% ($n = 24$) were severe (score 7−8). Pregnant women included in the study were divided into three groups, according to their skin types: Type A (Fitzpatrick Types 1 and 2), $n = 64$, 30.3%; Type B (Fitzpatrick Type 3), $n = 83$, 39.3%; Type C (Fitzpatrick Type 4), $n = 64$, 30.3%. Of pregnant women, 52.1% ($n = 110$) used no antistretch cream or oil. Some 34.6% of them ($n = 73$) used only oils (almond, cocoa, and olive oil) from the second trimester on, 10% ($n = 21$) used only antistretch cream in the same time period, and 3.3% ($n = 7$) used both oil and cream.

With regard to sociodemographic characteristics, no significant difference was found between groups in terms of methods for preventing striae, smoking, skin type, daily water consumption, striae history in adolescence, and income level. In the SG group, the presence of positive family history was significantly higher than in the group without SG ($p = 0.002$). In addition, the presence of a male fetus ($p = 0.042$) and low education level of the mother ($p = 0.033$) were also found to be significant factors in the development of SG (Table 1).

The mean age of the SG group was significantly lower than that of the non-SG group (23.1 ± 4.4 years vs. 26 ± 4.9 years, respectively; $p < 0.001$). In the group without SG, prepregnancy BMI was significantly lower than in the SG group (21.2 ± 3.5 vs. 23.2 ± 3.7, respectively; $p = 0.001$). The BMI value at admission was significantly higher in the SG group than in the group without SG (28.9 ± 3.5 vs. 26.6 ± 3.8, respectively; $p < 0.001$). In addition, abdominal circumference, the ratio of abdominal circumference to the length of the woman, and birth weight of the infant were significantly higher in the SG group. No significant difference was found between the two groups with regard to the difference between BMI at birth and prepregnancy BMI, weight gain during pregnancy, the ratio of weight gain to length, and gestational age at birth (Table 2).

According to logistic regression analysis, including all variables found to be significant in one-by-one comparisons, i.e., age, prepregnancy BMI, BMI at admission, abdominal circumference, birth weight, family history, sex of the infant, and maternal education level, it was established that each unit of decrease in maternal age increased the risk of SG by 1.15-fold [relative risk: 0.87; 95% confidence interval: 0.80−0.94] (Table 3).

Table 1
The development and comparison of personal characteristics according to the presence or absence of striae.

	Striae absent ($n = 52$) n (%)	Striae present ($n = 159$) n (%)	p
The use of any preventive method			
Does not use	32 (29.1)	78 (70.9)	0.252
Oil	16 (21.9)	57 (78.1)	
Cream	4 (19)	17 (81)	
Oil + cream	0	7 (100)	
Smoking			
Nonsmoker	35 (23.2)	116 (76.8)	0.543
Absent in pregnancy	12 (31.6)	26 (68.4)	
Present in pregnancy	5 (22.7)	17 (77.3)	
Skin type			
Type A	13 (20.3)	51 (79.7)	0.580
Type B	23 (27.7)	60 (72.3)	
Type C	16 (25)	48 (75)	
Daily water consumption (L)			
<1	6 (28.6)	15 (71.4)	0.770*
1.1–2	18 (20.9)	68 (79.1)	
2.1–3	21 (26.9)	57 (73.1)	
>3	7 (26.9)	19 (73.1)	
Adolescent period striae history			
Absent	33 (22.3)	115 (77.7)	0.225
Present	19 (30.2)	44 (69.8)	
Income level			
Very low–low	34 (22.2)	119 (77.8)	0.180
Middle–high	18 (31)	40 (69)	
Family history			
Absent	19 (42.2)	26 (57.8)	0.002
Present	33 (19.9)	133 (80.1)	
Sex of the infant			
Girl	31 (31)	69 (69)	0.041
Boy	21 (18.9)	90 (81.1)	
Education level			
Primary school and less	17 (17.7)	79 (82.3)	0.034
High school and over	35 (30.4)	80 (69.6)	

* Chi-square test for trend.

4. Discussion

The present study is the largest study in the literature on SG, investigating 25 different variables. In our study population, the prevalence of SG was 75.4%, congruent with the results of other studies in the literature.[10,16,17]

In a study carried out by Davey,[11] the use of oil and/or cream was found to be effective in preventing the development of striae; in the present study, similar to the study of Thomas and Liston,[12] oil and/or cream were ineffective from the second trimester onward against the development of SG. When the effect of cigarette consumption was evaluated, similar to the study of Osman et al,[8] it was not an important factor. With regards to the comparison of patients with respect to skin type, as in the study of Ghasemi et al,[10] skin type was not an important factor in the development of SG. Similarly, adolescent history of striae was not a significant factor, as reported by Chang et al.[1]

In previous studies, the rate of SG was significantly higher in women at low income level;[9,11,12] in the present study, the development of SG was found at a similar rate in women of low or higher income levels.

As in previous studies,[1,7,9,10,17] family history of SG was a significant factor for its development. Ghasemi et al[10] stressed that genetic factors play a role in SG.

Although a previous study by Osman et al[8] reported that the sex of the infant had no significant effect on the development of SG, in the present study, the rate of SG was found to be significantly higher in pregnant women with a male fetus. Atwal et al[9] reached the same conclusion as ours regarding the effect of fetal sex, finding a higher incidence of SG in women with male fetuses. This may be due to different levels of sex steroids between the fetal genders. However, there is no study in the literature to explain the mechanism of this entity.

When patients were evaluated according to their education level, it was established that the rate of SG was significantly higher among primary school graduates. It was thought that this was because pregnant women in this group conceived at an earlier age without adequate information on healthy nutrition. Education levels of the patients may have an effect on not only diet, but also exercise habits. However, these two variables were not investigated in our study.

Among the variables evaluated in the present study, the most important one is maternal age. As previously reported,[7,9,12]

Table 2
Comparison of variables between groups.

	Striae present ($n = 159$)	Striae absent ($n = 52$)	p
Age (y)	23.1 ± 4.4	26.0 ± 4.9	<0.001
Prepregnancy BMI (kg/m^2)	23.2 ± 3.7	21.2 ± 3.5	0.001
Postpregnancy BMI (kg/m^2)	28.9 ± 3.9	26.6 ± 3.8	<0.001
Abdominal circumference (cm)	101.4 ± 8.5	97 ± 7.6	0.001
Abdominal circumference/length (cm/cm)	0.62 ± 0.05	0.59 ± 0.05	0.002
Birth weight (g)	3407 ± 415	3158 ± 372	<0.001
Difference between postpregnancy and prepregnancy BMI (kg/m^2)	5.6 ± 1.9	5.3 ± 1.7	0.333
Weight gain (kg)	14.8 ± 5.2	14.0 ± 4.4	0.343
Weight gain / length (kg/cm)	0.09 ± 0.03	0.08 ± 0.02	0.367
Gestational age at birth (wk)	39.4 ± 1.1	39.1 ± 1.3	0.850

Values are given as mean ± standard deviation.
BMI = body mass index.

Table 3
Logistic regression analysis of significant factors.

Risk factor	RR (95% CI)*	*p*
Age	0.87 (0.80−0.95)	**0.001**
Prepregnancy BMI	1.10 (0.88−1.36)	0.400
Postpregnancy BMI	1.08 (0.85−1.36)	0.525
Abdominal circumference	1.00 (0.92−1.07)	0.924
Birth weight	1.00 (1.00−1.00)	**0.028**
Family history	2.12 (0.92−4.87)	0.089
Infant gender	1.49 (0.71−3.13)	0.293
Education level	1.65 (0.76−3.57)	0.204

Bold values indicate the statistical significance ($p < 0.05$).
BMI = body mass index; CI = confidence interval.
* RR: relative risk.

SG was significantly more common in women at younger ages. It was demonstrated in a previous study that the structure of fibrillin is more fragile in younger women, which may more easily lead to striae development.[6]

Similar to the report of Thailand et al,[7] we established that prepregnancy BMI and BMI at birth values were significantly higher in the group with SG than without. Differences between prepregnancy and postpregnancy BMI were more marked in cases with SG, but the difference between groups was not statistically significant. In a study with a larger number of cases, this difference may be found to be significant.

Like Ghasemi et al,[10] we observed that abdominal circumference of the pregnant woman was significantly higher in those with SG. The ratio of abdominal circumference to length was significantly higher in cases with SG, which is important since this variable was not addressed in previous studies.

When weight gain during pregnancy was evaluated, although studies in the literature reported that the difference in weight gain during pregnancy between those with SG and those without SG was not prominent,[1,10] in the present study, weight gain was significantly higher in the SG group. This may be because SG occurs as a result of increasing skin tension, caused by thickening of the subcutaneous tissue.

Consistent with previous studies,[7−9,12] birth weight of the infant was found to be significantly higher in the group with SG. It was thought that this may be attributed to the overstretching of the skin. Exercise during pregnancy may reduce the formation of SG by controlling weight gain. Exercise methods that are suitable for pregnant women will help to increase abdominal muscle strength, and this will also reduce the stress and strain on the abdominal skin that have made by the uterus. Despite the fact that some women are genetically predisposed for SG, athletes and women accustomed to heavy physical work get very few or no stretch marks. We did not study the effects of exercise on SG development. However, it is difficult to evaluate exercise habits as well as nutritional status. These may be expressed as a limitation of our study. However, a previous study demonstrated that these two variables had no effect on the striae development.[18] The effects of diet and exercise should be new research foci in the future, because there is a lack of data on these factors in pregnancy.

In conclusion, considering that SG is an important cosmetic problem which is not treatable, it is reasonable to inform women planning to conceive of the importance of factors influencing SG, such as prepregnancy body weight and the maternal age of conception.

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